

**ABSTRACT**

Systems of and methods for capturing a plurality of one-dimensional images representative of substantially all of the surface of a substrate within a single revolution of a rotating platen holding a polishing pad in operative contact with the surface of the  
5 substrate during chemical-mechanical planarization. A two-dimensional image comprising frame data, which may comprise a spectral image, is derived from the plurality of one-dimensional images. The frame data provides information useful for subsequent chemical-mechanical processing of the substrate.